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(54) IMPROVEMENTS IN OR RELATING TO  
 SEALING MACHINES

(71) We, W. VISIC & SONS LIMITED, a British Company, of Basset Works, Per-ranwell Station, Truro, Cornwall, do hereby declare the invention for which we pray  
 5 that a patent may be granted to us, and is in this latter position that the lids are placed in position and these then have to remain in position while the platen is pivoted around the vertical axis to a position under the sealing head; it is during  
 50 that displacement of the lids

ERRATUM

SPECIFICATION NO 1459094

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THE PATENT OFFICE  
 5 April 1977

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required contents, are known as such. Known machines of this type comprise a platen for supporting one or more containers while the lid or lids is or are placed  
 20 over the containers, and a sealing device which is pressed over the assembly and operated to effect a seal around the rim of the lids which have been placed over the containers. One disadvantage of known  
 25 machines of this type is that the preformed lids each have to be separately and accurately positioned over the containers before the seal can be effected; this takes up operator time, and there is also a risk  
 30 that the lid may become displaced after it has been placed in position and before the seal is made so that sealing of that container will not properly enclose the contents thereof.  
 35 This problem of lid displacement in previously known machines was also caused, in part, by the particular configuration of the known machines, which are provided with two platens pivoted about a central  
 40 vertical axis so that while one platen is located under a sealing head of the machine the other platen is accessible to allow removal of the previously sealed containers and loading of the next batch of  
 45 containers for sealing. It is while the platen

The machine of the present invention is simple and effective, and can be used to seal a plurality of containers in a single operation.

According to the present invention there 65 is provided a sealing machine for sealing one or more lids onto one or more containers comprising a support for one or a plurality of containers, a carrier for a roll of elongate strip material, a device for en- 70 gaging and advancing a free end portion of the strip material over the container support, a sealing head for pressing the free end portion of the strip down onto the or  
 75 each container on the container support and for forming a seal between the strip and the rim of the or each container, and means for cutting the free end portion of the strip from the remainder thereof on the roll, in which the strip advancing device in- 80 cludes a mechanism for flattening the leading edge of the strip prior to advancing it over the container support.

In operation of the machine of the present invention there is no risk of a lid 85 becoming displaced before it is sealed since the lid comprises a part of an elongate strip which is not moved into position until immediately before the sealing operation.

In a preferred embodiment of the in- 90

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(19)



(54) IMPROVEMENTS IN OR RELATING TO  
 SEALING MACHINES

(71) We, W. VISIC & SONS LIMITED, a British Company, of Basset Works, Perranwell Station, Truro, Cornwall, do hereby declare the invention for which we pray  
 5 that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates to sealing  
 10 machines. In particular the invention relates to a machine for sealing lids onto containers.

Machines for forming seals, and in particular for sealing lids onto containers  
 15 which have previously been filled with the required contents, are known as such. Known machines of this type comprise a platen for supporting one or more containers while the lid or lids is or are placed  
 20 over the containers, and a sealing device which is pressed over the assembly and operated to effect a seal around the rim of the lids which have been placed over the containers. One disadvantage of known  
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 45 containers for sealing. It is while the platen

is in this latter position that the lids are placed in position and these then have to remain in position while the platen is pivoted around the vertical axis to a position under the sealing head; it is during  
 50 this operation that displacement of the lids from the containers is most likely to occur.

The present invention seeks to provide a machine for forming and sealing one or  
 55 more lids onto one or a plurality of containers, in which it is unnecessary to provide preformed lids for the containers and in which there is no possibility of a lid being displaced from the container before the seal is effected.

The machine of the present invention is simple and effective, and can be used to seal a plurality of containers in a single operation.

According to the present invention there  
 65 is provided a sealing machine for sealing one or more lids onto one or more containers comprising a support for one or a plurality of containers, a carrier for a roll of elongate strip material, a device for  
 70 engaging and advancing a free end portion of the strip material over the container support, a sealing head for pressing the free end portion of the strip down onto the or each container on the container support  
 75 and for forming a seal between the strip and the rim of the or each container, and means for cutting the free end portion of the strip from the remainder thereof on the roll, in which the strip advancing device  
 80 includes a mechanism for flattening the leading edge of the strip prior to advancing it over the container support.

In operation of the machine of the present invention there is no risk of a lid  
 85 becoming displaced before it is sealed since the lid comprises a part of an elongate strip which is not moved into position until immediately before the sealing operation.

In a preferred embodiment of the in- 90

vention the strip advancing device comprises an actuator carrying gripping means which are reciprocable between first and second positions by the actuator and which  
5 are operable to grip the free end portion of the said elongate strip as they move from the first to the second position thereof.

In embodiments of the present invention the supports for one or a plurality of containers may be formed as two platens pivoted about a vertical axis in a known manner, the containers are then loaded in the same way but the lid-forming material is not located in position until after the  
10 loaded platen has been pivoted into a position under a sealing head of the machine.

Preferably the gripping means operate automatically to engage the strip during advancing movement thereof from the first  
20 position to the second position, and to release the strip during retracting movement from the second position to the first position. In this way the machine operates in an automatic cycle, the advancing device  
25 advancing to advance a length of the strip and then retracting ready to advance a subsequent length of the strip. Preferably there are provided means for clamping the leading edge of the strip in position when  
30 the reciprocating actuator is fully advanced so that the strip does not tend to return with the retracting movement of the actuator.

Preferably the gripping means comprise  
35 a first gripper element fixedly mounted on the said actuator, and at least one cooperating second gripper element pivoted about a substantially horizontal axis spaced from the first gripper element by a  
40 distance less than the dimension of the second gripper element from the pivot point to the free end thereof, the strip extending between the first and second elements. Thus movement of the actuator  
45 to advance the strip causes the gripper to engage the strip automatically whereas retracting movement of the actuator allows the second gripper element to pivot about the axis and slide over the strip without  
50 substantial frictional engagement therewith. The first gripper element may be formed as a gripping head which is carried on the actuator and substantially surrounds the leading edge of the strip and cooperates  
55 with the second gripper element to engage the strip during the advancing movement of the actuator.

In one embodiment there may be a plurality of second gripper elements in the  
60 form of finger spaced along a line transverse the length of the strip and pivoted at one end, although in an alternative embodiment the element may comprise a single substantially rectangular plate hinged  
65 along an upper substantially horizontal

edge thereof and extending transverse the length of the strip.

Conveniently there are provided means for automatically cutting off a length of the strip when it has been advanced, and  
70 preferably after the advancing device has retracted.

If a heat sealing process is effected by the machine, a convenient material is a plastics material film, such materials, however, tend to curl after they have been cut.  
75 It is for this reason that the advancing device carries the said means for flattening the leading edge of the strip. Preferably the edge flattening means covers the leading  
80 edge of the strip when it is actuated. In a preferred embodiment of the invention the edge flattening means include a plate which lies in a plane substantially parallel  
85 to the plane in which the film lies in operation of the machine, the plate having a front edge which extends transversely of the length of the film, with a plurality of  
90 recesses therein, and the said clamping means include a plurality of fingers which extend into the recesses in the front edge of the said plate to engage the said leading  
95 edge of the strip when the actuator has advanced the gripping means to the said second position thereof.

The machine may be operated semi-automatically by means of an arrangement of sensors and valves which cause the edge flattening means, the advancing device and the clamping means to operate in a suitable  
100 sequence, the edge flattening means operating to flatten the edge of the strip and subsequently the reciprocating actuator being extended, carrying with it the edge flattening means, to move the leading  
105 edge of the strip into position under the clamping means which operates, when the advancing device has reached a terminal position, to extend into engagement with  
110 the leading edge of the strip, following which the edge flattening means disengages and is carried back with the reciprocating actuator. A sealing head is subsequently lowered over the strip to effect sealing  
115 thereof onto the container or containers carried by the platen; the sealing head preferably carries a cutting mechanism which operates to cut the strip to length. If there are a plurality of containers the cutting mechanism may also operate to  
120 separate the length of strip into a suitable number of pieces so that the plurality of sealed containers will not be connected together when the sealing has been effected.

Further, there may be provided a hood  
125 which is movable to enclose the container or containers, the strip and the sealing head between itself and the platen, before the sealing operation is effected, so that a  
130

partial vacuum can be formed in the enclosure and/or a selected gas admitted thereto. Connections for a vacuum source and/or a source of the selected gas may be provided in the hood or in the platen, although these are preferably formed in the hood since the platen is preferably rotatable about a vertical axis with a similar platen which is attached thereto.

The sealing head may be directly heated in order to effect the sealing of the strip onto the containers, or alternatively may incorporate an impulse heating element.

It is preferred that all of the mechanical movements are effected by means of pneumatic actuators, although alternative means such as electric motors, hydraulic actuators or solenoids may be used in alternative embodiments if this should be desired.

One embodiment of the invention will now be more particularly described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a partly sectioned side view of a machine incorporating the invention;

Figure 2 is a front view of the machine illustrated in Figure 1;

Figure 3 is a plan view of a part of the machine illustrated in Figure 1; and

Figure 4 is an enlarged side view of a component part of the machine illustrated in Figure 1.

Referring now to Figure 1, the machine illustrated comprises a main support generally indicated 11 comprising a bed 11a, an upright support 11b and a head support 11c. Extending vertically between the head support 11c and the bed 11a there is an upright column 12 on which are mounted two platens 13 and 14. The platens 13 and 14 being pivotable mounted on the column 12.

Suspended from the head support 11c there is a hood 15 and a sealing head 16 both of which are mounted on a reciprocating actuator 17 by means of which they may be lowered over the platen 13 or 14 which is in position below them, or raised to a spaced position above the platens. Below the level of the platens 13 and 14 and aligned with the sealing head 16 there is a support table 18 which is carried on a pneumatic actuator 19 by means of which the support table can be advanced into a support position engaging under the appropriate platen, or retracted from the support position in order to allow rotation of the platens 13 and 14 about the support column 12.

Behind the support pillar 11b there are mounted two substantially parallel arms 20 and 21 between which is mounted a roll of elongate strip material 22, preferably in the form of a film 33 which is to be used for

forming lids over containers carried on the platens 13 and 14. Above the roll 22 there is a long pneumatic actuator 23 at the end 23a of which there is carried an automatic gripping device generally indicated 24. The free end of the strip wound on the roll 22 is engaged in the automatic gripping device 24 so that extension of the actuator 23 causes advancement of the strip from the roll over the platen which is located between the sealing head 16 and the support table 18.

In Figure 2 there can be seen, mounted for sliding movement on the support column 12 an array of fingers 25 which are carried on a transverse bar 26. The bar 26 is coupled to a further pneumatic actuator 27 (Figure 1) which is extendable to lower the fingers 25 onto whichever of the platens 13 or 14 is underneath. The fingers 25 are resiliently biased by respective springs 28 which urge the fingers downwardly to a position from which they can be displaced by engagement with the film over the platen. Thus, when the actuator 27 is extended to lower the fingers 25 by a distance slightly greater than the separation between the tip of the fingers 25 and the top of the platen 13 or 14 the springs 28 will hold the fingers 25 in a resiliently biased engagement with the platen, or with the film if this is interposed between the fingers and the platen.

The automatic gripping arrangement 24 is shown in greater detail in Figure 4; in this embodiment it comprises a plate 29, identifiable as the second gripper element mentioned above, which is hinged about a substantially horizontal axis 30 and which is slightly longer from the pivot axis 30 to the free end 29a thereof than the separation between the axis 30 and a substantially horizontal plate 31, identifiable as the first gripper element, which is supported, together with the pivot axis 30, on the end 23a of the pneumatic actuator 23. On the upper surface of the substantially horizontal plate 31 there is a transverse ridge 32 against which the lower edge 29a of the plate 29 abuts. A nylon strap 70, carried by a clamp bar 71, engages the plate 29 in such a way as to apply a slight biasing force to urge the lower edge 29a against the ridge 32. The tension applied by the strap 70 is adjustable by releasing the clamp bar 71 and adjusting the position of the strap 70 under it. The film, which is generally indicated 33 extends between the ridge 32 and the plate 29 such that, as the actuator 23 extends, a tension on the film 33 is applied in the direction of the arrow A of Figure 4 and this causes the plate 29 to tend to rotate in the counter clockwise direction thereby increasing the frictional force between the film 33 and

the ridge 32 and clamping the film 33 against the ridge 32 so that the leading edge of the film is carried with the plate 31 as the actuator 23 extends. The plate 29 thus acts as a "letterbox shutter," since when the actuator 23 acts to retract, the frictional force on the film 33 is decreased and if the leading edge of the film 33 is held to prevent it moving with the letterbox shutter the latter will allow the film 33 to flow freely between the end 29a of the plate 29 and the ridge 32.

Also mounted on the end 23a of the actuator 23 is a mechanism for flattening the leading edge of the film since this tends to curl upwardly when cut. The edge flattening mechanism comprises an upper plate 34 spaced a small distance above the plate 31 carried on the end 23a of the actuator 23 such that the film 33 can extend between the two plates 34 and 31. The plate 34 is attached at each end, that is at each side of the film 33 to a plate 35 which lies beneath the plate 31, and the plate 35 is coupled by a bracket 36 to a small pneumatic actuator 37 which is mounted on a plate 38 coupled to the horizontal plate 31. The pneumatic actuator 37 is coupled to a control valve (not shown) which feeds the actuator 37 immediately before the actuator 23 upon advance, so that the actuator 37 is in the extended position before the actuator 23 commences to extend; similarly, in the reverse direction, the actuator 37 is fed immediately before the actuator 23 is controlled to retract, so that the actuator 37 is itself retracted immediately before any retraction movement of the actuator 23 takes place.

The plate 34 has a plurality, in this case 4, of forwardly facing recesses 34a (Figure 1) which are spaced along the front edge of the plate 34 at the same separation as and at transverse positions corresponding to the positions of the fingers 25 of the clamping arrangement.

With the machine initially in the position illustrated in Figure 1 a cycle of operations is as follows:—

Containers to be sealed are loaded into a recess 14a of the platen 14 and the platens are rotated about the support column 12 until the containers to be sealed are positioned under the sealing head 16. The pneumatic actuator 37 is then energised to advance, displacing the plates 34 and 35 forwardly to cover the leading edge of the film 33. Subsequently the actuator 23 advances and the letterbox shutter 29 clamps the film 33 to the ridge 32 so that the roll 22 is unwound and the film 33 is advanced over the platen 14 as the actuator 23 extends. When the actuator 23 reaches the end of its movement a microswitch or other suitable sensor (not shown) is en-

ergised and the actuator 27 is fed to lower the fingers 25 so that they move down into the recesses 34a of the plate 34 and press four portions of the leading edge of the film 33 against the platen 14.

The actuators 37 and 23 are then energised to retract and as the actuator 23 retracts the plate 29 forming the letterbox shutter allows the film 33 to pass between the end 29a of the plate 29 and the ridge 32 mounted on the plate 31 so that the gripping device 24 releases the film 33 which thus remains in position held by the fingers 25 of the clamping device. When the actuator 23 is fully retracted a further microswitch or other sensor (not shown) detects this condition and energises the actuator 17 to lower the hood 15 and the sealing head 16 down over the platen 14, and simultaneously energises the actuator 19 to raise the support table 18 to a position contacting the lower face of a recess 14b in the platen 14. The hood 15 is provided with a sealing ring 15a around the lower periphery thereof so that as the actuator 17 extends to lower it into engagement with the platen 14 a totally sealed enclosure is formed.

The hood 15 may be formed with couplings (not shown) for connection to a vacuum source and/or to a source of flushing gas so that after the hood 15 has been lowered onto the platen 14 to form a sealed enclosure, the enclosure, including the containers mounted in the platen 14 which are not yet sealed, can be evacuated and the air replaced with a suitable inert gas. The actuator 17 is then further energised to lower the sealing head 16 right down until it presses the free end portion of the strip down into the containers in the recess 14a of the platen 14.

A number of knives 35', 36', 37' are carried on the lower face of the sealing head 16 and these operate to cut the film which has been advanced over the platen 14, into the appropriate number of pieces, one for each container just before the sealing head 16 is pressed against the rim of each container with the film 33 interposed therebetween: a heat seal is then made either by direct resistance heating or by impulse heating. The table 18 supported by the actuator 19 provides a mechanical support so that the sealing head 16 can be pressed onto the platen 14 with sufficient pressure to effect the sealing without damaging the pivots by means of which the platens 13, 14 are supported on the column 12.

When the seal has been formed the actuator 17 is retracted to raise the hood 15 and sealing head 16, the actuator 19 is lowered to lower the table 18 and the platens 13 and 14 are pivoted to exchange the positions thereof. While the sealing

operation was being effected upon the platen 14, the platen 13 could have been loaded with filled containers ready for sealing, the cycle of operations discussed above can then be carried out on the platen 13 while the sealed containers from the platen 14 are being unloaded and a fresh load of containers inserted in the recess 14a. Unloading of containers from the recesses 13a or 14a can be facilitated by means of upwardly projecting fingers which can be extended through the recess 13b or 14b to raise the filled containers therefrom.

The machine described above has a number of advantages over known sealing machines in that operation can be effected more rapidly by virtue of the automatic transfer of the sealing film over the containers when the platens are in position under the sealing head, and also in that there is no possibility of a preformed lid becoming displaced from its position on a container before the sealing operation can be effected.

A further pneumatic actuator (not shown) may also be provided immediately behind the retracted position of the advancing mechanism and mounted on a transverse bar (also not shown in the drawings). The further pneumatic actuator is positioned substantially vertically for extension downwards and carries a resilient pad, such as foam rubber, at the end of the extendable arm thereof. Immediately beneath the further cylinder a transverse aluminium strip is provided over which the film extends. The further cylinder is extended to clamp the film in position between the pad and the aluminium strip at all times except when the advancing mechanism is actually in operation and acts to hold the film securely in position in the machine. This is helpful in ensuring that the film does not slip backwards out of the machine under its own weight, when the movement is sufficiently slow and the tension in the strip is sufficiently low not adequately to engage the plate 29 of the letter box shutter to prevent such movement.

#### WHAT WE CLAIM IS:—

1. A sealing machine for sealing one or more lids onto one or more containers comprising a support for one or a plurality of containers, a carrier for a roll of elongate strip material, a device for engaging and advancing a free end portion of the strip material over the container support, a sealing head for pressing the free end portion of the strip down onto the or each container on the container support and for forming a seal between the strip and the rim of the or each container, and means

for cutting the free end portion of the strip from the remainder thereof on the roll, in which the strip advancing device includes a mechanism for flattening the leading edge of the strip prior to advancing it over the container support.

2. A sealing machine as claimed in Claim 1, in which the strip advancing device comprises an actuator carrying gripping means which are reciprocable between first and second position by the actuator and which are operable to grip the free end portion of the said elongate strip as they move from the first to the second position thereof.

3. A sealing machine as claimed in Claim 2, in which the gripping means operate automatically to engage the end of the strip during advancing movement from the first position to the second position thereof, and to release the strip during retracting movement from the second position to the first position.

4. A sealing machine as claimed in Claim 2 or Claim 3, in which the gripping means comprise a first gripper element fixedly mounted on the said actuator, and at least one cooperating second gripper element pivoted about a substantially horizontal axis spaced from the first gripper element by a distance less than the dimension of the second gripper element from the pivot point to the free end thereof, the strip extending between the first and second elements.

5. A sealing machine as claimed in Claim 4, in which there are provided a plurality of second gripper elements in the form of fingers spaced along a line transverse the length of the strip.

6. A sealing machine as claimed in Claim 4, in which the second gripper element comprises a single rectangular plate hinged along an upper substantially horizontal edge thereof and extending transverse the length of the strip.

7. A sealing machine as claimed in any preceding Claim in which the said mechanism for flattening the leading edge of the strip prior to advancing it over the container support, includes means which are held in contact with the free end of the strip during the advancing movement of the advancing device.

8. A sealing machine as claimed in Claim 2 or any of Claims 3 to 7 when appended to Claim 2, in which there are provided means for clamping the leading edge of the strip in the position to which it is moved when the said reciprocating actuator advances the gripping means to the said second position thereof.

9. A sealing machine as claimed in Claim 7 and Claim 8, in which the said means which are held in contact with the

free end of the strip during the advancing movement of the advancing device, comprises a plate which lies in a plane substantially parallel to the plane in which the strip lies in operation of the machine, the plate having a front edge which extends transversely of the length of the strip, with a plurality of recesses therein, and the said clamping means include a plurality of fingers which extend into the recesses in the front edge of the said plate to engage the said leading edge of the strip when the actuator has advanced the gripping means to the said second position thereof.

10. A sealing machine as claimed in any preceding claim, in which the containers are supported on the machine by a platen thereof, and the machine is further provided with a hood which is movable between a raised position spaced from the platen, and a lowered position in which a seal is formed around the rim thereof between the hood and the platen.

11. A sealing machine as claimed in claim 10, in which the hood is also provided with means for admitting a selected flushing gas to the region enclosed between itself and the platen.

12. A sealing machine as claimed in

any preceding claim, in which the sealing head which is engageable with the strip to press this onto the or each container supported by the machine, is provided with heating means in order to effect sealing of the strip onto the rim of the or each container.

13. A sealing machine as claimed in any of Claims 1 to 12, in which the sealing head has an impulse heating element in order to effect sealing of the strip onto the rim of the or each container.

14. A sealing machine as claimed in Claim 12 or Claim 13, in which the sealing head is formed with a cutter which operates to separate the strip into a plurality of pieces to form individual lids for the containers as the sealing head is lowered into position to effect a sealing operation.

15. A sealing machine substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

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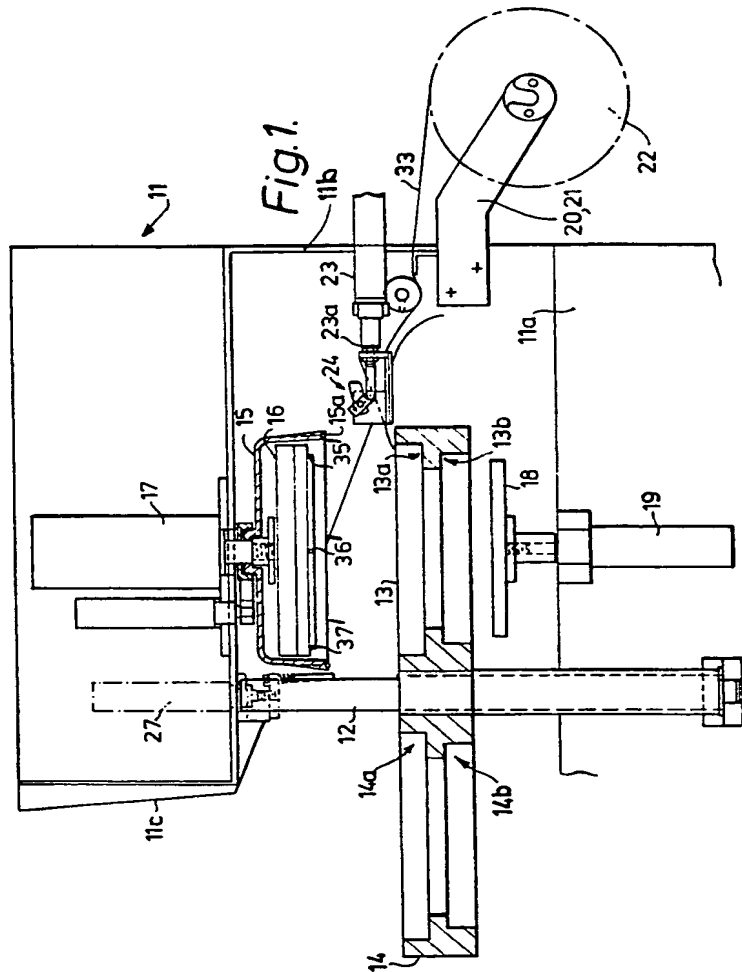
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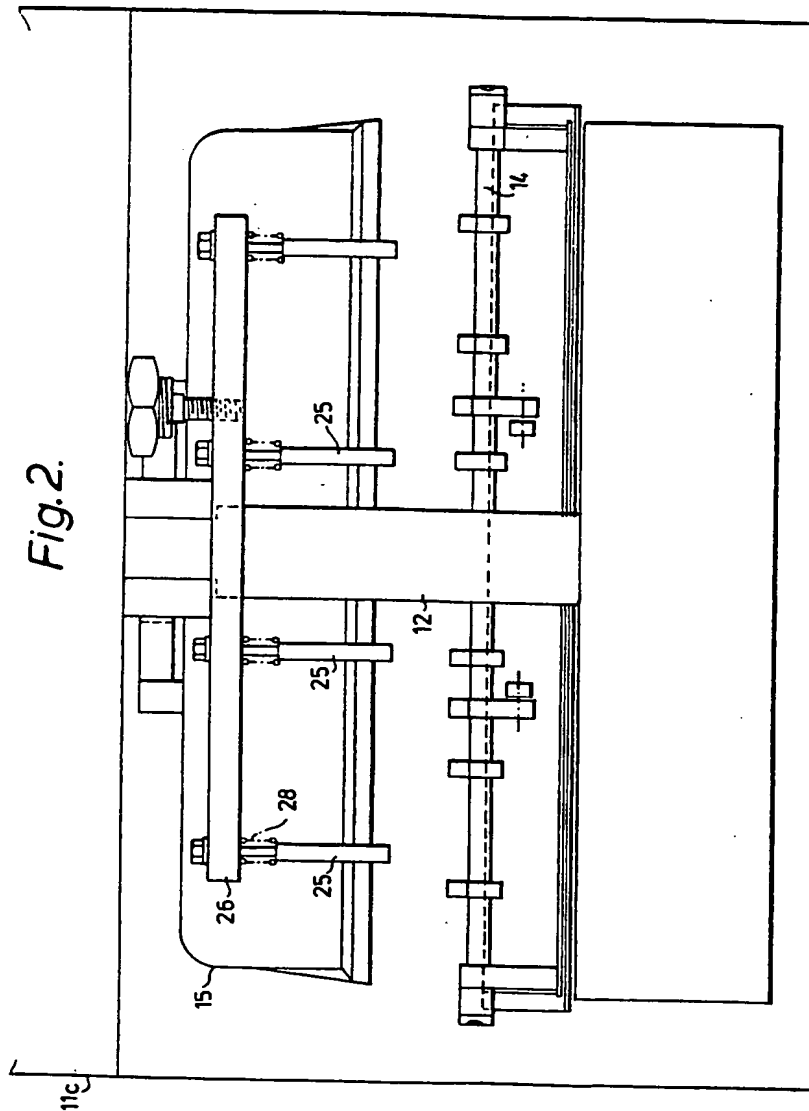
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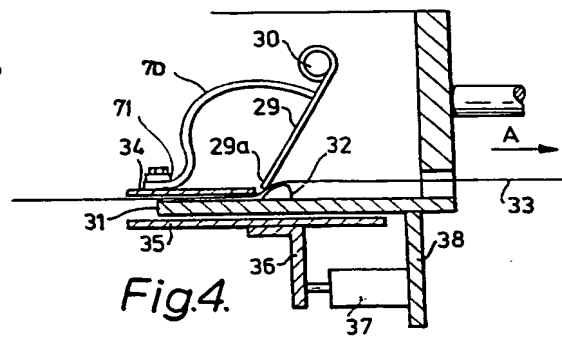
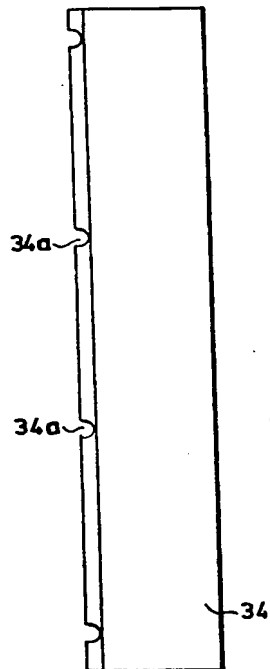
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